ENGLISH (UK)

REFERENCE GUIDE

CT2020
v.1.3

ENGLISH (UK)

Please read this first!

If you do not understand the contents of this manual:
Do not operate this equipment.

Also, translation of this manual into any EC official language can be made available, at your cost.

ITALIANO

LEGGERE QUESTO AVVISO PER PRIMO!

Se non si capisce il contenuto del presente manuale
NON UTILIZZARE L'APPARECCHIATURA.

È anche disponibile la versione italiana di questo manuale, ma il costo è a carico dell'utente.

SVENSKA

LÄS DETTA FÖRST!

Om Ni inte förstår informationen i denna handbok
ARBETA DÅ INTE MED DENNA UTRUSTNING.

En översättning till detta språk av denna handbok kan också anskaffas, på Er bekostnad.

NEDERLANDS

LEES DIT EERST!

Als u de inhoud van deze handleiding niet begrijpt
STEL DEZE APPARATUUR DAN NIET IN WERKING.

U kunt tevens, op eigen kosten, een vertaling van deze handleiding krijgen.

PORTUGUÊS

LEIA O TEXTO ABAIXO ANTES DE MAIS NADA!

Se não compreende o texto deste manual
NÃO UTILIZE O EQUIPAMENTO.

O utilizador poderá também obter uma tradução do manual para o português à própria custa.

SUOMI

LUE ENNEN KÄYTTÖÄ!

Jos et ymmärrä käsikirjan sisältöä
ÄLÄ KÄYTÄ LAITETTA.

Käsikirja voidaan myös suomentaa asiakkaan kustannuksella.

FRANÇAIS

AVANT TOUT, LISEZ CE QUI SUIT!

Si vous ne comprenez pas les instructions contenues dans ce manuel
NE FAITES PAS FONCTIONNER CET APPAREIL.

En outre, nous pouvons vous proposer, à vos frais, une version française de ce manuel.

DANSK

LÆS DETTE FØRST!

Udstyret må ikke betjenes

MEDMINDRE DE TIL FULDE FORSTÅR INDHOLDET AF DENNE HÅNDBOG.

Vi kan også for Deres regning levere en dansk oversættelse af denne håndbog.

DEUTSCH

LESEN SIE ZUERST DIESEN HINWEIS!

Sollte Ihnen der Inhalt dieses Handbuches nicht klar verständlich sein, dann
Bedienen Sie dieses Gerät nicht.

Eine Übersetzung des Handbuches in dieser Sprache ist gegen Berechnung lieferbar.

ΕΛΛΗΝΙΚΑ

ΔΙΑΒΑΣΤΕ ΠΡΩΤΑ ΑΥΤΟ!

Αν δεν καταλάβετε το περιεχόμενο αυτού του βοηθήματος/εγχειριδίου
ΜΗΝ ΛΕΙΤΟΥΡΓΗΣΕΤΕ ΑΥΤΟΝ ΤΟΝ ΕΞΟΠΛΙΣΜΟ.

Επίσης, αυτό το εγχειρίδιο είναι διαθέσιμο σε μετάφραση σε αυτή τη γλώσσα και μπορείτε να το αγοράσετε.

ESPAÑOL

LEA ESTE AVISO PRIMERO!

Si no entiende el contenido de este manual
NO OPERE ESTE EQUIPO.

Podemos asimismo suministrarle una traducción de este manual al (idioma) previo pago de una cantidad adicional que deberá abonar usted mismo.

List of Contents

Chapter 1: Introduction to the CT2020

Gives a general description of the equipment, main features and functions. Identifies the controls, indicators and connectors on the front and rear panels.

Chapter 2: Installing the Equipment

Provides a guide to the suitability of an installation and gives detailed procedures for the preparation and installation of the equipment. Also details the external connectors and provides **important safety information**.

Chapter 3: Operating the Equipment Locally

Describes local control in detail. Provides the power-up/power-down procedures and other general operating/control/set-up procedures.

Chapter 4: Application note for wireless HD Camera's

Describes the mounting of the CT2020HD on the Sony 1500 Camera

Annex A: List of Abbreviations

Annex B: Technical Specification

Contents

Preposition

List of Contents ii

About this Reference Guide vi

Nomenclature vi

Acknowledgements vii
- General vii
- Registered Trademarks vii
- Trademarks vii

Warnings, Cautions and Notes viii
- Heed Warnings viii
- Read Instructions viii
- Follow Instructions viii
- Retain Instructions viii

EMC Compliance viii

Contact Information ix
- BMS-Europe Customer Services ix
- Technical Training x
- Customer Services and Technical Training Postal Address x
- Return of Equipment x
- Technical Publications x

Chapters 1 to 4

1. Introduction to the CT2020HD 10
- 1.1 Preliminary Remarks 10
- 1.2 Designation and P/N 10
- 1.3 Description 11

2. Installing the Equipment 12
- 2.1 Safety instructions 12
- 2.2 Connectors 13
- 2.3 Shut-Down 14

3. Operating the Equipment 15
- 3.1 Multifunctional display 15
- 3.2 Menu structure 16
- 3.3 Frequency input (1) 17
- 3.4 Resolution (3) 17
- 3.5 Framerate (4) 18
- 3.6 Modulation (5) 19
- 3.7 Latency (6) 20
- 3.8 Audio Select (7) 21

3.9 Audio L /R Input (8 and 9) 22
3.10 Aud L/R Gain (10 and 11).....23
3.11 Mic Phantom (12 and 13) 23
3.12 Data Freq (14) (optional) 25
3.13 Output Power (15) 26
3.14 Contrast (16).....26
3.15 Display OFF (17) 27
3.16 Software (18) 27
3.17 Status* (19).....28
3.18 Encoder FW* (20) 28

4. APPLICATION NOTE FOR WIRELESS HD CAMERAS 30

4.1 Introduction.....30

4.2 Mounting instructions for CT2020HD on the Sony 1500 camera.....31

Appendix A List of Abbreviations

Appendix B Technical Specification

B.1… Compliance B-1
B.1.1 Safety B-1
B.1.2 EMC B-1
B.1.3 Shock and Vibration B-2
B.1.4 CE Marking B-2
B.1.5 FCC Marking..... B-2

B.2 Technical Specifications..... B-4

About this Reference Guide

This Reference Guide provides instructions and information for the installation and operation of the CT2020.

This Reference Guide should be kept in a safe place for reference for the life of the equipment. It is not intended that this Reference Guide will be amended by the issue of individual pages. Any revision will be by a complete reissue. Further copies of this Reference Guide can be ordered from the address shown on *page ix*. If passing the equipment to a third party, also pass the relevant documentation.

Issues of this Reference Guide are listed below:

Issue	Date	Build Version	Comments
1	March 2008	1.0	Initial release.
2	August 2008	1.1	New chapters integrated
3	March	1.2	Changes CT2020HD to CT2020
4	November 2010	1.3	Changes in Menu Structure

Note…

The Build Version in the table refers to an overall number which encompasses all the various software/firmware versions of video, audio, etc in the device.

Acknowledgements

General

All best endeavors have been made to acknowledge registered trademarks and trademarks used throughout this Reference Guide. Any notified omissions will be rectified in the next issue of this Reference Guide. Some trademarks may be registered in some countries but not in others.

Registered trademarks and trademarks used are acknowledged below and marked with their respective symbols. However, they are not marked within the text of this Reference Guide.

Registered Trademarks

AC-3®, Dolby Digital® and Pro Logic® are registered trademarks of Dolby Laboratories Licensing Corporation.

Musicam® is a registered trademark of Thomson and Télédiffusion de France (TDF), Europe, and is a registered trademark of CCS (now Musicam USA Incorporated), USA.

Ethernet® is a registered trademark of Xerox Corporation.

XILINX® is a registered trademark of Xilinx Inc.

Warnings, Cautions and Notes

Heed Warnings

All warnings on the product and in the operating instructions should be adhered to. The manufacturer can not be held responsible for injuries or damage where warnings and cautions have been ignored or taken lightly.

Read Instructions

All the safety and operating instructions should be read before this product is operated.

Follow Instructions

All operating and use instructions should be followed.

Retain Instructions

The safety and operating instructions should be retained for future reference.

Warnings...

Warnings give information which, if strictly observed, will prevent personal injury or death, OR DAMAGE TO PERSONAL PROPERTY OR THE ENVIRONMENT. They are boxed and shaded for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

Cautions...

Cautions give information which, if strictly followed, will prevent damage to equipment or other goods. They are boxed for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

Notes...

Notes provide supplementary information. They are highlighted for emphasis, as in this example, and are placed immediately after the relevant text.

EMC Compliance

This equipment is certified to the EMC requirements detailed in *Annex B, Technical Specification*. To maintain this certification, only use the leads supplied or if in doubt contact Customer Services.

RF Exposure Info:

For body worn operation, device has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions device a minimum of 20cm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

Technical Training

Training Courses

BMS Europe provides a wide range of training courses on the operation and maintenance of our products and on their supporting technologies. BMS can provide both regularly scheduled courses and training tailored to individual needs. Courses can be run either at your premises or at one of our dedicated training facilities.

Where to Find Us

For further information on BMS Europe training program please

contact us:

International Telephone: + 49 6124 7239-00
International Facsimile + 49 6124 7239-29

Customer Services and BMS Europe Postal Address

BMS-Europe GmbH

Schwalbacher Straße 12

65321 Heidenrod – Kemel

Germany

Return of Equipment

If you need to return equipment for repair, please contact

Tel: + 49 6124 7239-00

Fax: + 49 6124 7239-29

BMS-Europe GmbH

Schwalbacher Straße 12

65321 Heidenrod – Kemel

Germany

1. Introduction to the CT2020HD

1.1 Preliminary Remarks

This manual is provided for users and operators of the CT2020 Transmitter. It is intended to support the installation, operation, maintenance and daily use of the unit in general.

The manual should be kept with the CT2020 Transmitter and may be consulted when questions occur. Should problems remain after you have read the manual carefully or if you have any further questions concerning the functionality or operation of the Transmitter, please contact Customer Service.

1.2 Designation and P/N

Designation CT2020HD

Frequency range	P/N
2.0 – 2.3 GHz	11.2422.500
2.3 – 2.6 GHz	11.2422.100

other frequencies and models on request

1.3 Description

General Information on D-ENG (Digital Electronic News Gathering)

The introduction of the DVB standard established the basis for digital broadcast video transmission making efficient use of the available bandwidth. Powerful compression algorithms allow a reduction in the amount of data to be transferred, while maintaining the high quality standards for video and audio signals used in broadcasting applications. New modulation techniques and error correction algorithms ensure a secure signal transmission even when the transmission conditions are poor.

The DVB-T standard was established for terrestrial digital TV broadcasting, in particular considering the difficult conditions of radio transmission. The highly efficient OFDM multicarrier modulation procedure enables transmission without interference even under multipath propagation conditions occurring with non-directional transmission or reception. Practical experience soon has proved that the DVB-T standard guarantees ruggedness of transmission to an extent even allowing mobile reception.

Increasing miniaturization, in particular of MPEG encoders and OFDM modulators, enables using the DVB-T standard for mobile portable transmission systems.

Previous analog FM systems were adversely affected by signal reflections directly resulting in video and audio interferences. Such effects do not occur when the digital ENG system (D-ENG) is deployed. Even mobile transmission from moving vehicles or the use of omni-directional antennas on the transmitting or receiving side does not impair the picture or sound quality at all, opening a completely new range of applications in TV production and news gathering.

Video Inputs

The CT2020 accepts only HDSDI*(HD version) and SDI information at the input:

- SDI BNC(f)

OFDM (Orthogonal Frequency Division Multiplex) Modulator

The digital data signal for wireless transmission is processed by the OFDM Modulator and following IQ Modulator. The OFDM modulation procedure has a major impact on the transmission properties and was specifically developed for terrestrial radio transmission.

User interface

The integrated Multifunctional Display allows easy configuration of the device. The current Software and firmware version can also be displayed.

Linear Power Amplifier

The linear power amplifier amplifies the output signal of the Modulator to an output of about 400 mW (+26 dBm at 2GHz, depending on frequency). The output port is located on top of the device.

2. Installing the Equipment

2.1 Safety instructions

Warning

The regulations of VDE0100 must be observed for installation and operation of the unit.

Caution

- Establish all other connections before starting the unit by connecting it to 12VDC. Essential, a valid video signal must be connected to the desired input before power on the CT2020.
- When you connect the CT2020 as described in the following sections, make sure that the "Caution" instructions given there are observed.
- Make sure that there is sufficient air circulation to ensure adequate cooling of the unit.
  External forced ventilation may be required if the unit is installed in a rack or cabinet.

2.2 Connectors

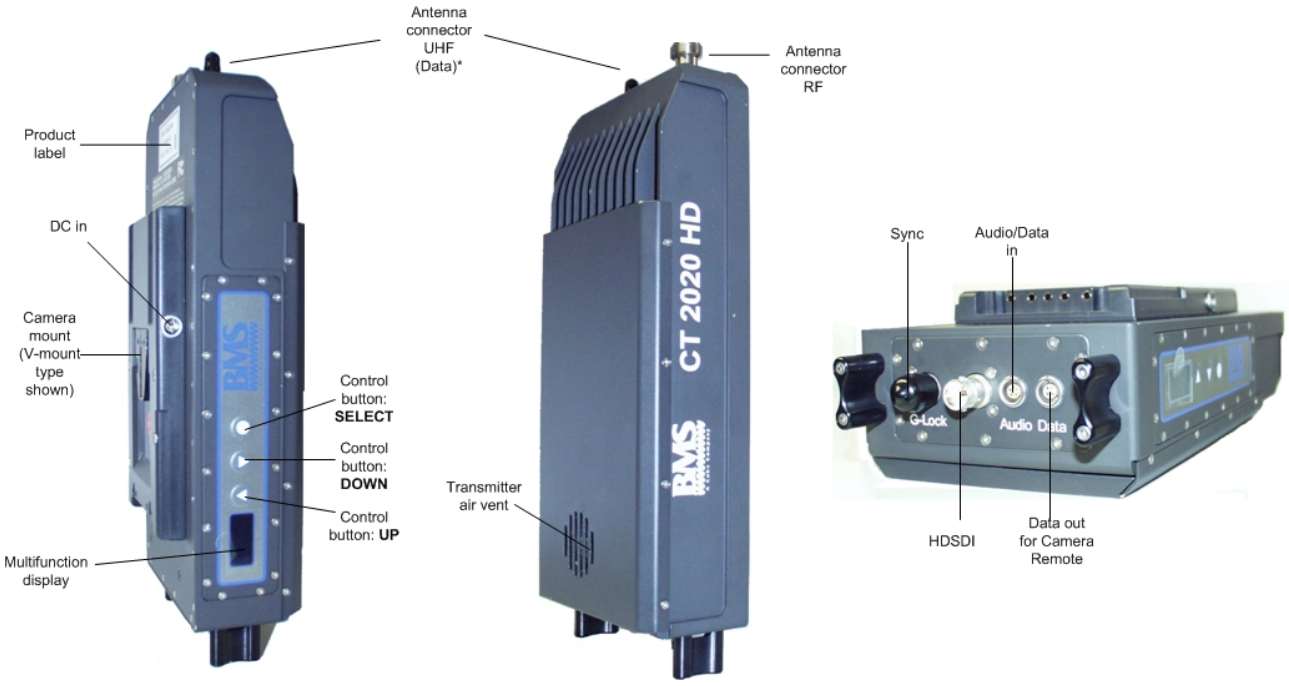


Figure 1 Input connector of the CT2020*(HD version)

RF Connector

The RF output signal of the Low-Power Amplifier is fed out at the N(f) connector on top of the unit.

The CT2020 provides RF output of about 400 mW (+26dBm) at 2GHz band.

Connecting Signal Sources

The Video signal supplied by the camera has to be applied to the SDI BNC(f) connector of the transmitter.

The analogue Audio signal supplied by the camera has to be applied to the Audio in 5pol Lemo connector of the transmitter.

Connecting the RF Output

An omni directional antenna with N(m) connector can be directly mounted at the RF out socket.

Connecting the UHF Data Input (optional)

An UHF antenna with SMA(m) connector can be directly mounted at the UHF in socket.

Connecting the 12VDC Supply Voltage

Caution

When using a battery or power pack, make sure that the maximum supply current is at least 3A and the output voltage matches the input voltage range of the CT2020.

Failure to comply with these requirements **may cause fatal damage** to the battery/power pack and/or CT2020.

Battery Powered Operation of the CT2020

Many types of batteries are available on the market and we tried to support the best ones.

2.3 Shut-Down

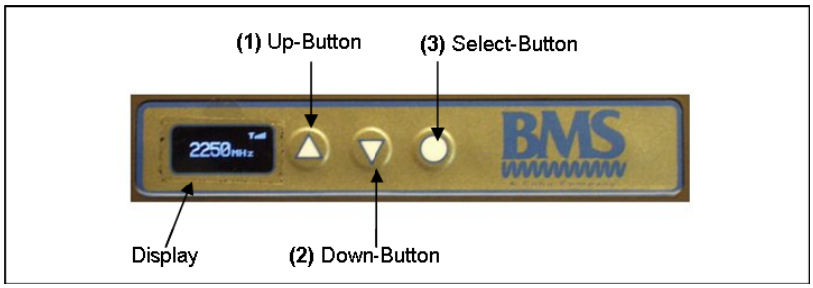
Caution

To shut-down the unit you have to disconnect first the 12VDC supply voltage.

After disconnection from the supply voltage by removing the battery or disconnecting the 12VDC supply cable, the other connecting cables can be removed from the unit.

3. Operating the Equipment

3.1 Multifunctional display



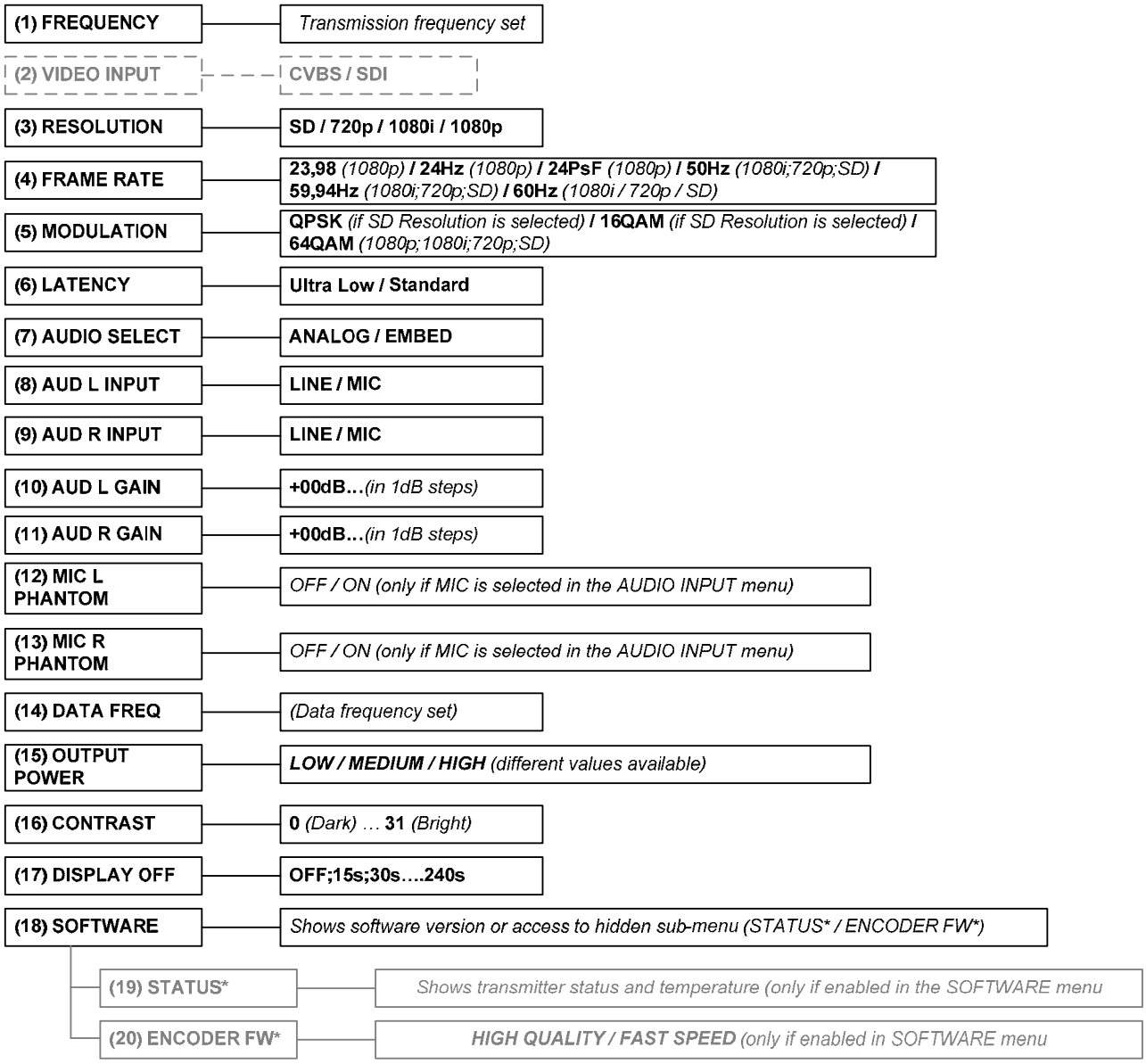
During start up the transmitter is in a self test mode. After the self test the transmitter's name is displayed before the display permanentlyshows the current frequency.

Current transmission frequency

The automatic COFDM setup is very easy to handle.

When the Enter-Button is pressed and held for approximately 2 seconds the setup menu is accessible:

3.2 Menu structure


(1) FREQUENCY
Transmission frequency set
(2) VIDEO INPUT
CVBS / SDI
(3) RESOLUTION
SD / 720p / 1080i / 1080p
(4) FRAME RATE
23,98 (1080p) / 24Hz (1080p) / 24PsF (1080p) / 50Hz (1080i;720p;SD) / 59,94Hz (1080i;720p;SD) / 60Hz (1080i / 720p / SD)
(5) MODULATION
QPSK (if SD Resolution is selected) / 16QAM (if SD Resolution is selected) / 64QAM (1080p;1080i;720p;SD)
(6) LATENCY
Ultra Low / Standard
(7) AUDIO SELECT
ANALOG / EMBED
(8) AUD L INPUT
LINE / MIC
(9) AUD R INPUT
LINE / MIC
(10) AUD L GAIN
+00dB...(in 1dB steps)
(11) AUD R GAIN
+00dB...(in 1dB steps)
(12) MIC L PHANTOM
OFF / ON (only if MIC is selected in the AUDIO INPUT menu)
(13) MIC R PHANTOM
OFF / ON (only if MIC is selected in the AUDIO INPUT menu)
(14) DATA FREQ
(Data frequency set)
(15) OUTPUT POWER
LOW / MEDIUM / HIGH (different values available)
(16) CONTRAST
0 (Dark) … 31 (Bright)
(17) DISPLAY OFF
OFF;15s;30s….240s
(18) SOFTWARE
Shows software version or access to hidden sub-menu (STATUS* / ENCODER FW*)
(19) STATUS*
Shows transmitter status and temperature (only if enabled in the SOFTWARE menu
(20) ENCODER FW*
HIGH QUALITY / FAST SPEED (only if enabled in SOFTWARE menu

Use Up and Down button to navigate through this menu. To activate a sub menu press Enter-button for 2 seconds.

To exit all sub menus press Enter button.

3.3 Frequency input (1)

At the frequency menu the current frequency is displayed.

To change the frequency press Enter button for 2 sec.

The inverted digit displays the current changeable position of the frequency. By use of Up and Down button the inverted digit can be changed, digit by digit. To confirm a change and switch to the next position of the frequency press Enter-button and continue with the next digit. To save the changed frequency and leave this sub-menu press Enter-button after all digits of the frequency are set.

3.4 Resolution (3)

In the sub menu “Resolution” the desired resolution of your transmitter can be chosen.

Four options for resolution are available. For proper selection, please check the video output of your camera.

- SD
- 720p (HD version)
- 1080i (HD version)
- 1080p (HD version)

To edit the resolution sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired modulation by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.5 Framerate (4)

After setting the resolution (1080p/1080i/720p/SD) it is important to set the correct corresponding frame-rate.

Please check, at all costs, which HD output signal, which resolution the video signal has and which frame-rate (1080p/1080i/720p) the camera is set to. A list of the resolution and corresponding frame rates is added below.

The following Frame rates are available:

- 23,98 Hz (1080p) – (only HD verion)
- 24 Hz (1080p) – (only HD verion)
- 24 PsF (1080p) – (only HD verion)
- 50 Hz (1080i/720p/SD)
- 59,94 Hz (1080i/720p/SD)
- 60 Hz (1080i/720p/SD)

To edit the frame rate sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired frame rate by pressing the Enter-Button.

To exit this submenu press Enter-Button.

> **Note**
>
> With PsF, a progressive frame is sliced into two "segments", with the odd lines in one segment and the even lines in the other segment. This allows for a progressive picture to be processed through the same electronic circuitry that is used to store, process and route interlaced video. Technically, progressive segments are equivalent to interlaced fields, but unlike native interlaced video, there is no motion between the two fields to make up the video frame, both fields represent the same instant in time.

3.6 Modulation (5)

In the sub menu “Modulation” the Modulation method can be changed. The following options are available:

- QPSK (if SD Resolution is selected)
- 16 QAM (if SD Resolution is selected)
- 64 QAM (1080p/1080i/720p/SD)

Below table shows the Bitrates for the different modulation options. FEC and Guard Interval will be changed automatically along with the selected modulation.

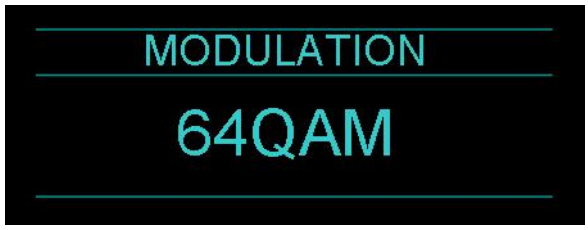
Bitrate for SD Modulations

Modulation	FEC	GUARD	BITRATE
QPSK	½	1/32	6.03 MBit/s
16QAM	½	1/32	12.06 MBit/s
64QAM	½	1/32	18.09 MBit/s

Bitrate for HD Modulations

Modulation	FEC	GUARD	BITRATE
64QAM	2/3	1/32	24.13 MBit/s

> **Note**
> If you have selected the HD resolution 1080p or 1080i or 720p a modulation of 64QAM will be used and can not be changed.



To edit the modulation sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired modulation by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.7 Latency (6)

In the sub-menu “Latency” the latency can be chosen. There are two settings, “Ultra low” and “Standard”.

If low latency is your requirement, then please use the “Ultra-low” setting

If you require a higher picture quality then use the option “Standard”.

To edit the latency sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired latency by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.8 Audio Select (7)

In the sub-menu “AUDIO SELECT” the required Audio input can be chosen.

- EMBED (Embedded)
- LINE

Please set the transmitter Audio input to match the selected Audio input source. For example, if you use a microphone or line audio then please chose the option “LINE”. If Embedded Audio will be used, then “EMBEDDED” must be selected

To edit the ”AUDIO SELECT” sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired audio input by pressing the Enter-Button.

To exit this sub-menu press Enter-Button.

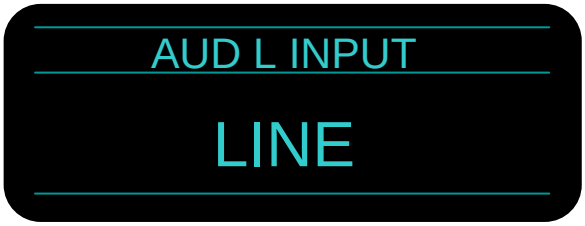
3.9 Audio L /R Input (8 and 9)

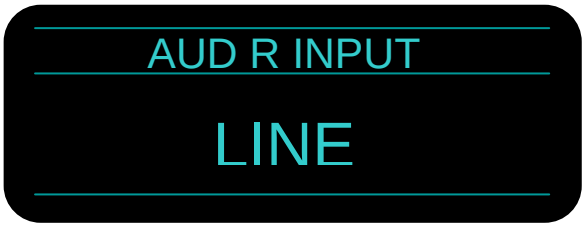
In the sub menu “AUD L INPUT” and “AUD R INPUT” the required Audio input can be chosen for the two different channels

- LINE
- MIC

Please set the transmitter Audio input to match the selected Audio input source. For example, if you use a microphone then please chose the option “MIC”. Having chosen “MIC” then you must check further settings under sub-menu points (Mic Gain) & (Mic Phantom)

Correspondingly the choice of “LINE” Option for an external Audio signal would require checking and adjusting the settings for point 7 (Line Gain).





To edit the audio input sub-menu press Enter-Button for 2 seconds.

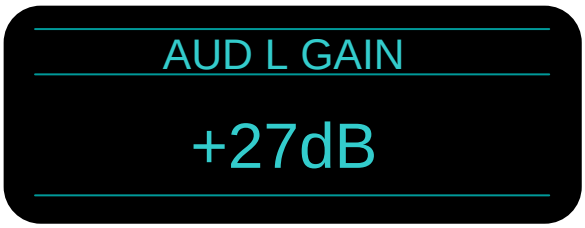
Use the Up- and Down-Buttons for navigation and select the desired audio input by pressing the Enter-Button.

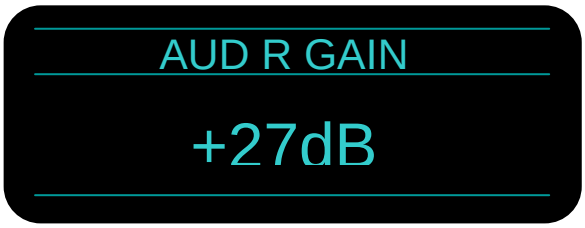
To exit this sub-menu press Enter-Button.

3.10 Aud L/R Gain (10 and 11)

The sub-menu “AUD L GAIN” and “AUD R GAIN” gives the possibility to add additional gain to the audio input. “AUD GAIN” Line amplification options are

+00dB;+10dB…..(in 1dB steps)…..+65dB





To edit the “AUD L/R GAIN” gain sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired gain by pressing the Enter-Button.

To exit this sub-menu press Enter-Button.

3.11 Mic Phantom (12 and 13)

In the “MIC PHANTOM” sub-menu the use of a condenser Microphone is supported and “ON” or “OFF” can be set.

> **Note:**
> In general, phantom voltages are used to power electronics within condenser microphones. Condenser microphones require power for various parts of their operation, including impedance converters, preamplifier circuitry and, in some cases, to polarized microphone capsules. Phantom is usually a DC voltage ranging from 12 to 48 volts. Microphones draw current from this voltage based on their needs.

Warning

Before selecting MIC L/R PHANTOM on, please make sure that a microphone is connected to the audio inputs

To edit the “MIC L/R PHANTOM” sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired mic phantom by pressing the Enter-Button.

To exit this sub-menu press Enter-Button.

3.12 Data Freq (14) (optional)

In the sub menu “Data Freq” the frequency of the data receiver can be set. However, this setting is only valid for those models of the CT2020HD Series, which have integrated data receivers for remote operation of the camera installed.

At the bottom of the display a bar is displayed. This is an indicator of UHF receive strength, the “stronger” the bar the “stronger” the signal at the antenna.

The frequency may be changed in 10Khz steps.

Please be aware that the RX frequency will have to match the TX frequency of the UHF data transmitter to enable remote operation of the camera.

UHF Data Receive Quality ‘bar’

To edit the data freq sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired data freq by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.13 Output Power (15)

In the sub menu “Output Power” you can adjust the power output. The more power is selected the further is the distance the signal can be transferred. There are three different power settings:

- LOW (10mW) at 2GHz
- MEDIUM (100mW) at 2GHz
- HIGH (400mW) at 2GHz

To edit the power output sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired power output by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.14 Contrast (16)

According to the brightness in your surrounding you may want to adjust the “Display Contrast”.

The range is between 0= Dark to 31= Bright. The contrast value at delivery is 8.

To edit the display contrast sub-menu press Enter-Button for 2 seconds.

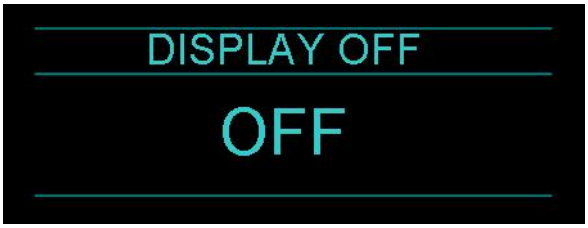
Use the Up- and Down-Buttons for navigation and select the desired display contrast by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.15 Display OFF (17)

The sub menu “Display OFF” controls the automatic switch off function. If you wish to have the display always on, this should be set to “OFF”. Otherwise you have the possibility to have the display active for a predefined time ranging from 15 and 240 seconds, in 15 second steps before it switches off.

Edit mode is reached by pressing Enter-Button for 2 seconds. Here, through buttons 1 & 2, the desired duration value can be entered. Please confirm selection with Enter-Button.



To edit the display off sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired option for display off by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.16 Software (18)

This sub-menu displays the actual Software and Firmware versions number.

3.17 Status* (19)

This sub-menu displays the actual Status

N.B. This menu is reachable through menu point 14 (Software) and after that and while the unit is switched on remains visible however if power is removed for any reason please go back to menu point 14 and repeat the procedure to reach menu point 15 again.

To enable the Status Menu:

Please go to the Menu-point “Software“ (14)

Next press Enter-Button for 2 seconds. After 2 seconds release Enter-Button and press Up-Button (arrow up), you have now reached the special “Status” menu.

3.18 Encoder FW* (20)

N.B. This menu is reachable through menu point 14 (Software) and after that and while the unit is switched on remains visible however if power is removed for any reason please go back to menu point 14 and repeat the procedure to reach menu point 16 again.

The complete transmitter performance can be influenced with the changing of the Firmware. Here, the choice of “HI QUALITY” will give you the best picture quality however with a slight penalty on the latency side and on the other side the choice of “HIGH SPEED” will give the optimum latency, however with a penalty on the picture quality.

Please be aware: When this setting is changed the transmitter must be completely re-started. This is achieved by separating the transmitter from the power supply. Please wait 10 seconds before connecting the transmitter back to the power supply. Because new Firmware has been loaded a 5 minute re-boot is required. A % table indicates the re-boot status.

To change the Encoder Firmware:

Please go to the Menu-point “Software“ (14)

Next press Enter-Button for 2 seconds. After 2 seconds release Enter-Button and press Up-Button (arrow up), you have now reached the special “Encoder FW” menu.

As explained above you can now choose between the special settings “HI QUALITY” and “FAST SPEED”. Please confirm the selection with Enter-Button and wait. After approximately 10 seconds please perform a re-boot.

4. Application note for wireless HD cameras

4.1 Introduction

The typical cameras that were used today in the broadcast section are triax cameras which are used for wireless applications as well. Mostly the customers can not afford an additional HD camera with Battery mounts for wireless applications.

As an example we take the Sony 1450, 1500 or 1550 camera which are the most frequent cameras in the broadcast section.

Caution

- The original cameras have no mount and no support for batteries
- Also we as BMS do not recommend screwing a bracket on a camera for a day by day use. Therefore we are trying to use original Sony brackets or for other cameras other original brackets which can support a adaptor for wireless applications

Sony camera without V-mount bracket

Sony camera with Sony V-mount bracket attached

> **Note**
>
> The V-mount bracket for Sony cameras is part of the Sony viewfinder and not separately available!

4.2 Mounting instructions for CT2020HD on the Sony 1500 camera

1. In the menu of the Sony 1500 camera the user has the possibility to configure all connectors at the camera. Please configure the SDI connector in the camera-menu. Set the SDI connector to HD-SDI output. Before you proceed to the next step, please make sure which kind of HD video signal you get at the output connector of the camera. The best way to check this, is to connect the programmed output connector of the HD camera with a HD-control monitor which will show the user the parameter of the video signal at the camera output.

> **Note**
>
> The HD video parameter of the camera has to comply with the parameter of the transmitter. Please check the output video signal before proceeding.

Please see below table for an example for HD video parameter:

Resolution	Frame rate
1080p	23,98
1080p	24
1080i	50
1080i	59,94
1080i	60
720p	50
720p	59,94
720p	60

Please write down the video settings which you get from the HD control monitor regarding resolution and frame rate. You will need these settings later when you have to configure the transmitter, otherwise you will not be able to transmit a video signal!

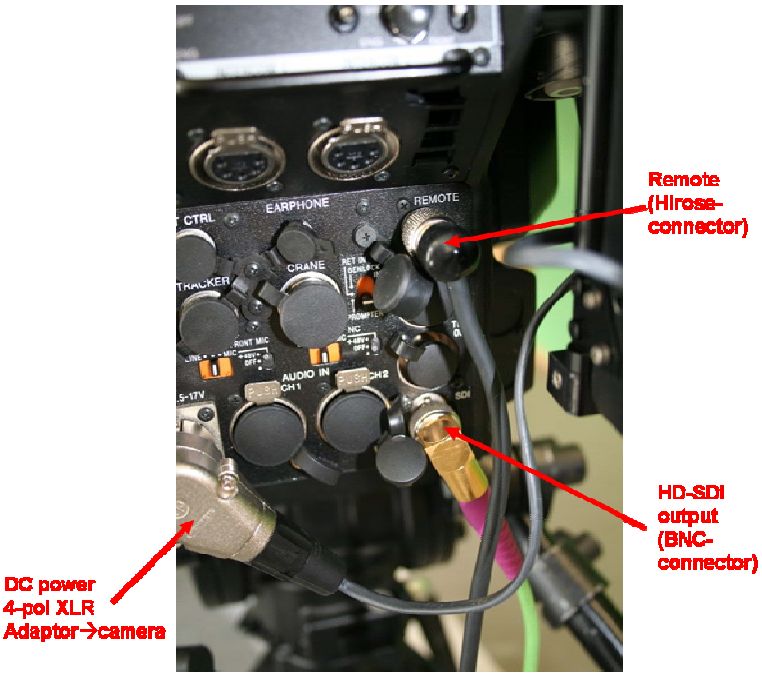
2. Now fix the adaptor on the Sony monitor V-mount bracket.

Push the adaptor into the V-mount bracket until it snaps in.

3. After you have fixed the adaptor on the camera you will have to connect the cables to the camera, therefore you have to open the back of the adaptor to be able to get access to the connectors.

Press the little lever down and open the back door of the adaptor. Now you have free access to all the connectors on the back of the camera.

4. Now you have to connect first the cables at the camera and then to the transmitter



First connect the short BNC video cable to the HD-SDI video output connector. After that, connect the remote cable (Hirose-connector) to the remote connector of the camera.

There is a 4-pol XLR cable which is fixed at the adaptor, please connect this cable to the DC input of the camera as shown in the picture.

Note

This camera has no audio output connector, therefore you have to use an extension cable from the camera microphone to the transmitter on the backside of the camera

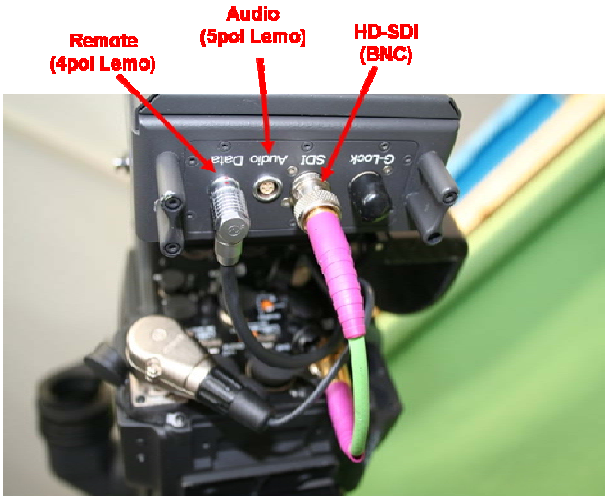
5. When you have finished connecting the cables to the camera please close the door of the adaptor, fix the two antennas on the transmitter and fix the transmitter to the adaptor.

To fix the transmitter to the adaptor push the transmitter from up to down until it snaps into the V-mount bracket.

Caution

- Please double check that the transmitter is firmly attached

6. Now you can connect the cables to the transmitter.



Connect the remote cable to the “Data”, (4pol Lemo), the audio cable from the microphone to the “Audio” (5pol Lemo) and the HD-SDI video cable to the “SDI” connector.

7. The next step will be to turn on the camera and the transmitter.

Caution

- Be sure that the antennas are fixed
- Be sure that all the cables are connected

Now push the battery into the V-mount adaptor until it snaps in. After you attached the battery the transmitter will start automatically. If the camera is turned off please turn the camera on.

8. At this point you have finished with the connections. Now you will have to set the HD video settings in the transmitter, otherwise you will not be able to transmit any video.

At step 1 you checked the output video signal of the HD camera with its resolution and frame rate and which you have written down. Please make a note of these settings and configure the transmitter likewise. This is very important!

> **Note**
>
> Configure the transmitter with the same parameters of the HD video signal you checked with the HD control monitor

At this point the transmitter is receiving the right signals and you can proceed to the configuration of the transmitter and transmission.

List of Abbreviations

The following specific abbreviations are used within this document:

4:2:0	Digital video coding method in which the color difference signals are sampled on alternate lines at half the luminance rate.
4:2:2	Digital video coding method in which the color difference signals are sampled on all lines at half the luminance rate.
COFDM	Coded Orthogonal Frequency Division Multiplex (digital modulation procedure)
Composite	CVBS video signal, 1 V_{pk-pk}
CVBS	Color Video Black Sync Signal
D-ENG	Digital Electronic News Gathering
DVB-T	Digital Video Broadcasting Terrestrial
EMC	Electromagnetic Compatibility
ETS	European Telecommunications Standard
FBAS	German for CVBS
FEC	Forward Error Correction
FM	Frequency Modulation (analog modulation procedure)
IF	Intermediate Frequency
IEC	International Electro-technical Committee
ISO	International Standards Organisation
kbit/s	1000 bits per second
Mbit/s	Million bits per second.
MP@ML	Main Profile at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 15 Mbit/s over various mediums.
MPEG	Motion Pictures Experts Group (compression technique)
NTSC	National Television Systems Committee
OFDM	Orthogonal Frequency Division Multiplex
QAM	Quadrature Amplitude Modulation: A method of modulating digital signals
QPSK	Quadrature phase shift keying (digital modulation technique)
PAL	Phase Alternation Line (a color TV broadcasting system)
PCM	Pulse Code Modulation
RF	Radio Frequency
RGB	Red, green, blue. The chroma information in a video signal.
RS 232, RS-232	EIA-232

SDI	Serial Digital Interface
TS	Transport Stream
XLR	Audio connector featuring three leads, two for signal and one for GND
YUV	Y: Luminance component (brightness), U and V: chrominance (color difference)
Y/C	Broadcast Video with separate color, Y luminance and C chroma (sometimes called S-Video)

Technical Specification

B.1 Compliance[1]

B.1.1 Safety

This equipment has been designed and tested to meet the requirements of the following:

EN 60950	European	Safety of information technology equipment including business equipment.
IEC 60950	International	Safety of information technology equipment including business equipment.

B.1.2 EMC[2]

The equipment has been designed and tested to meet the following:

EN 55022 and AS/NZS 3548	European Australia and New Zealand	Emission Standard Limits and methods of measurement of radio frequency interference characteristics of information technology equipment - Class A.
EN 61000-3-2[3]	European	Electromagnetic Compatibility (EMC), Part 3 Limits; Section 2. Limits for harmonic current emissions (equipment input current ≤ 16 A per phase).
EN 61000-3-3[3]	European	Electromagnetic Compatibility (EMC), Part 3. Limits; Section 3. Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current ≤ 16 A.
EN 55024:1998	European	Information technology equipment - Immunity characteristics - Limits and methods of measurement.

[1] The version of the standards shown is current as of time of manufacture.

[2] The EMC tests were performed with the Technical Earth attached and configured using recommended cables.

[3] Applies only to models of the equipment using mains (ac) power sources.

B.1.3 Shock and Vibration

The device chassis complies with the requirements of ETS 300-019-2-5 Table 2, for both non-operational and operational states, without any special mounting or casing requirements over and above the standard mounting requirements specified.

ETS 300-019-2-5	European	Equipment Engineering (EE): Environmental conditions and environmental tests for telecommunications equipment Part 2-5: Specification of environmental tests Ground Vehicle Installations. Table 2.

B.1.4 CE Marking

CE

The CE mark is affixed to indicate compliance with the following directives:

89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

73/23/EEC of 19 February 1973 on the harmonisation of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits.

B.1.5 FCC Marking

FCC ID: VFB-CT2020HD-2000 for P/N 11.2422.500

VFB-CT2020HD-2300 for P/N 11.2422.100

Radio Frequency Interference (FCC 15.105)

This equipment has been tested and found to comply with the limits for Class B digital devices pursuant to Part 15 of the FCC Rules. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Labeling Requirements (FCC 15.19)

This equipment complies with Part 15 of FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

Modifications (FCC 15.21)

Changes or modifications to this equipment not expressly approved by BMS may void the user's authority to operate this equipment.

B.2 Technical Specifications

Frequency	2.0 - 2.3 GHz or 2.3 – 2.6 GHz (other on request)
Video Input	HDSDI - BNC(f)
Audio Input	2x Analogue audio in (Line or Mic Level) – 5pol Lemo
Modulator	COFDM, ETS 300744, 2k carriers only Bandwidth: 8 MHz QPSK,16 QAM,64 QAM
RF Output Power	400 mW
Power Input	11 to 17.5 VDC
Power Consumption	23W
Operating Conditions	Ambient temperature -20°C to +45°C
Dimensions (W x D x H)	272 mm x 106 mm x 56 mm (without Battery bracket)
Weight	1.45 kg approx